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10/521,305	01/14/2005	Toru Ishibashi	CFO17416WOUS	9351

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EXAMINER	
BHAT, NARAYAN KAMESHWAR	
ART UNIT	PAPER NUMBER
1634	

NOTIFICATION DATE	DELIVERY MODE
01/07/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/521,305	ISHIBASHI ET AL.	
	Examiner	Art Unit	
	NARAYAN K. BHAT	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20,23 and 24* is/are pending in the application.

4a) Of the above claim(s) *1-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-20,23 and 24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continued Examination under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 16, 2009 has been entered.

Claim Status

2. Claims 1-20 and 23-24 are pending in this application. Claims 14-20 are amended. Claim amendments have been reviewed and entered. Claims 21-22, 25 and 26 have been cancelled. Applicants arguments filed on September 16, 2009 have been fully considered and addressed following claim rejections.

3. Claims 1-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention of groups I to IV without traverse in the reply filed on March 13, 2007. The restriction was made final in the office action mailed on May 18, 2007.

4. Claims 14 -20 and 23-24 are under prosecution.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 14-16, 19-20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwaki et al (USPGPUB 2002/0110903 filed Dec. 13, 2001) in view of Allain et al (Fresenius J. Anal. Chem., 2001, 371, 146-150).

Regarding claims 14 and 24, Iwaki et al teaches a method of producing a probe carrier having a probe that is specifically bindable to a target substance on a surface of the substrate comprising following steps.

Iwaki et al teaches providing an aqueous medium (i.e., solution) containing a probe having a linker containing an ionic group, i.e., a functional group (Fig. 2, probe molecule -labeled by wavy line, functional group on the probe –labeled as J-, paragraphs 0017, 0058 and 0059). Iwaki et al also teaches that the aqueous medium also contains an ionic reactive group (i.e., second functional group) and further teaches

that the ionic reactive group is an amino group of silane coupling agent (paragraphs 0017 and 0064-0065). Iwaki et al also teaches providing solution containing a probe and a silane coupling agent simultaneously onto the surface of the substrate as a drop having a volume of 100 picoliter by an inkjet method (paragraphs 0017 and 0078-0079). Iwaki et al do not teach providing solution as droplets.

Iwaki et al also teaches that the probe molecules are oligonucleotides or polynucleotides (paragraph 0030) and further teaches that the probe has thiol group, i.e., mercapto group (paragraph 0009) and is ionic (paragraph 0023). Mercapto and amino groups of Iwaki et al are the acidic and basic functional groups as defined in the instant claim 19. The mercapto (i.e., acidic) and amino (i.e., basic) functional groups are the first and second functional groups as defined in the instant claim.

Instant specification defines linker as substance that exists between the probe and the first functional group and links the probe to the first functional group (paragraph 0038). Therefore, the first nucleotide that links thiol group to the oligonucleotide probe of Iwaki et al is reasonably interpreted as the linker as defined in the instant specification.

Iwaki et al also teaches immobilizing the probe on the surface of the substrate (Fig. 2 and paragraphs 0078 and 0079), wherein the surface of the substrate comprises glass (paragraph 0062).

Iwaki et al also teaches that a combination of the ionic mercapto group on the probe and the ionic reactive amino group on the silane coupling agent are "electrostatically fixed on the carrier" (Fig. 2, paragraph 0059), which encompasses the fist and second functional groups are in the state of coupling without covalently bonding.

Regarding additional limitation of claim 24 requiring a plurality of probes each having a linker containing a first functional group, Iwaki et al teaches that probes having a linker containing a mercapto group (i.e., first functional group) are immobilized on the surface of the substrate as number of spots and further teaches that the probe molecules present in different spots are the same or different (paragraphs 0079 and 0080). Combined teachings of Iwaki et al of probe carrying a linker and a first functional group and immobilizing as spots on the surface of the substrate carrying probes encompasses a plurality of probes as claimed.

Regarding claims 15 and 23, as described above Iwaki et al teaches that the first functional group is a mercapto group and the second functional group is an amino group. The dissociation constant of amino group is 1.0×10^{-6} and the mercapto group is 1.0×10^{-12} or more as defined by the instant specification (USPGPUB paragraphs 0025 and 0043). The dissociation constants are inherent properties of the functional groups that are chosen and both the functional groups of the instant claim are taught by Iwaki et al. Furthermore, when the thiol group or the amino group binds to each other, causes a change in the properties that are specific to the “thiol and amino groups” including the mutual chemical shift of signals in the NMR spectrum.

Regarding claim 16, Iwaki et al teaches that probe comprises an oligonucleotide or a nucleic acid (paragraph 0030).

Regarding claims 19 and 20, Iwaki et al teaches mercapto and amino groups (paragraphs 0023 and 0065) wherein amino group is a primary amino group (paragraph 0065).

As described above, Iwaki et al teaches providing a solution onto the surface the substrate as a drop having a volume of 100 picoliter by an inkjet method (paragraphs 0017 and 0078-0079). Iwaki et al do not teach providing solution as droplets. However, providing a solution onto the surface of the substrate as droplets was known in the art at the time of the claimed invention was made as taught by Allain et al.

Allain et al teaches a method providing a solution carrying a probe onto the surface of the substrate as droplets by inkjet method (Fig. 1a and pg. 146, column 2, paragraph 2 and pg. 148, column 2, paragraph 1, lines 11-14). Allain et al also teaches delivering probe solution as droplets to the surface requires small sample volume and occupies small surface area on the substrate thereby producing higher density of probes per array (Fig. 1b and pg. 146, column 2 and paragraph 2).

It would have been prima facie obvious to one having the ordinary skill in the art at the time the invention was made modify the step of providing solution onto the surface of the substrate as drops of Iwaki et al with the step of providing solution as droplets of Allain et al with a reasonable expectation of success.

An artisan would be motivated to apply the solution as droplets in producing the probe carrier of Iwaki et al with the expected benefit of requiring a small sample volume occupying small surface area on the substrate thereby producing higher density probes per array as taught by Allain et al (Fig. 1b and pg. 146, column 2 and paragraph 2).

8. Claims 14, 16, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwaki et al (USPGPUB 2002/0110903 filed Dec. 13, 2001) in view of

Allain et al (Fresenius J. Anal. Chem., 2001, 371, 146-150) as applied to claims 14 and 16 as above and further in view of McGovern et al (USPN 6,159,695 issued December 12, 2000).

Claim 17 is dependent from claim 16. Claims 16 and 18 are dependent from claim 14. Teachings of Iwaki et al and Allain et al regarding the claims 14 and 16 are described above in section 7.

Regarding claims 17 and 18, Iwaki et al teaches that a SH- reactive group is incorporated into the oligonucleotide (paragraph 0009). Instant specification defines linker as substance that exists between the probe and the first functional group and links the probe to the first functional group (USPGPUB, paragraph 0038). Teaching of Iwaki et al of first nucleotide that links thiol group to the oligonucleotide, thus is the linker of the claim. Iwaki et al and Allain et al do not teach the location of the linker and linker comprising polyether chain. However, location of the linker and linker comprising polyether chain were known in the art at the time of the claimed invention was made as taught by McGovern et al.

McGovern et al teaches attachment of tether linker to oligonucleotides to introduce sulfhydryl group at the 3' end (Fig. 4A and column 15, lines 16-20) and linker comprise polyether linker of 2-50 unit (column 22, lines 53 –58). McGovern et al also teaches tether linker supply the oligonucleotide with reactive functionality so that it can be chemically manipulated, and to allow the oligonucleotide to extend any specified distance away from the surface (column 7, lines 18-22).

It would have been prima facie obvious to one having the ordinary skill in the art at the time the invention was made to modify the linker of Iwaki et al with the polyether linker of McGovern et al with a reasonable expectation of success.

An artisan would be motivated to modify the linker of Iwaki et al with the expected benefit of providing additional reactive functionality so that the probe can be chemically manipulated, thereby allowing the oligonucleotide to extend any specified distance away from the surface as taught by McGovern et al (column 7, lines 18-22).

Response to remarks from Applicants

Claim Rejections under 35 U.S.C. § 103(a)

9. Applicant's arguments filed on September 16, 2009 with respect to claims 14-16 and 19-24 being unpatentable over Iwaki et al and Duran et al have been fully considered (Remarks, pgs. 9-12). These arguments are moot in view of withdrawn rejection and new rejection as set forth in this office action necessitated by claim amendments. Applicant's arguments regarding teachings of Iwaki et al as it pertains to the rejections made in this office action are discussed below.

Applicants argue that Iwaki does not teach or suggest providing droplets of solution containing both the probe and silane coupling agent to a substrate by inkjet method (Remarks, pg. 10, paragraph 3). This argument is not persuasive because as described above in section 7, Iwaki teaches providing a drop of solution containing both the probe and silane coupling agent onto a substrate by inkjet method (paragraphs 0017, 0058 and 0059) and Allain et al teaches providing solution comprising probe as

droplets onto the substrate for increasing the density and number of probes on the substrate (Fig. 1, pg. 148, column 2, paragraph 1, lines 11-15). Furthermore, Applicants are reminded that claims 14 and 24 are rejected with combination of references of Iwaki and Allain under 35 USC 103 (a). Arguments made by attacking individual references are not persuasive when rejections are based on combination of references (See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)). In the instant case both Iwaki and Allain are interested in a method of producing a probe carrier having a probe. As described above, Iwaki et al teaches the claimed method steps as recited in the instant claims 14 and 24 except for providing solution to the surface of the substrate as droplets. Allain teaches the delivery of solution to the surface of the substrate as droplets for increasing the probe density on the array and therefore arguments are not persuasive.

Applicants further argue that Iwaki does not teach or suggest providing solution containing both probe and silane coupling agent onto the surface of the substrate via inkjet method. Applicants further assert that Iwaki et al teaches bringing probe molecules and the ionic reactive groups onto the surface separately (Remarks, pg. 10, paragraph 3, last two sentences). Applicant's assertion regarding bringing probes and ion reactive reagents separately by Iwaki et al is acknowledged. However, Iwaki et al teaches a plurality of embodiments for immobilizing probes onto the surface of a substrate. As described above in section 7, Iwaki et al in view of Allain et al teaches solution containing probe molecules and ionic reactive group comprising silane coupling agent are provided onto the surface simultaneously (paragraph 0017) and further

teaches the inkjet method for providing said solution as droplets onto the surface (paragraphs 0078 and 0079). Therefore Applicant's arguments regarding teachings of Iwaki et al bringing probes and ion reactive groups onto the surface separately are not persuasive.

Regarding claim 24, Applicants reiterate similar arguments made for claim 14 (Remarks, pgs. 11 and 12). They are not persuasive for the same reasons as described above.

Applicant's argument regarding claims 14 and 16-18 with respect to teachings of McGovern et al are directed towards McGovern et al not compensating the deficiency of Iwaki et al (Remarks, pgs. 13-14). This argument is not persuasive because as described above, Iwaki et al in view of Allain et al teaches method steps of providing solution containing probes and silane coupling agents as droplets onto the surface as claimed. McGovern et al is relied on the teachings of linker location.

Applicant's argument regarding claims 25 and 26 with respect to teachings of Iwaki et al, Duran et al and Allain et al (Remarks, pgs. 13 and 14) are moot in view of cancellation of said claims. Applicants arguments with respect to teachings of Iwaki et al and Allain et al as it pertains to the rejection made in this office action are discussed below.

Applicant's arguments with respect to teachings of Allain et al directed towards not compensating the deficiency of Iwaki et al (Remarks, pg. 14, paragraph 2). This argument is not persuasive for the same reasons as described above.

Applicants further argue that Allain et al do not teach o suggest that the solution comprises both probe and silane coupling agent (Remarks, pg. 14 and paragraph 2, pg. 15, paragraph 1). These arguments are not persuasive because as described above claims 14 and 24 are rejected over combination reference of Iwaki et al and Allain et al. Iwaki teaches solution containing probes and silane coupling agent as drops and reference of Allian et al is relied for providing solution as droplets for increasing probe density on the substrate.

Applicants further argue that probes are not deposited via bubble jet printing (Remarks, pg. 14, paragraph 3). This argument is not persuasive because Allain et al teaches solution as droplets onto the surface of the substrate by inkjet method (Fig. 1a and pg. 147, Array spotting section and pg. 148, column 2, paragraph 1). Furthermore, Applicants have not provided support documents or affidavits illustrating probe solution of Allain et al does not provide a droplet. For these reasons arguments are not persuasive.

Applicants further argue that while Allan et al teaches using a bubble jet printer method to deposit biological sample on a membrane, Allan does not teach or suggest using such methods on the substrate (Remarks, pg. 15, paragraph 1). This argument is not persuasive because as described above, reference of Iwaki et al is relied on the delivery of probes and silane coupling agents simultaneously to the surface as drops using inkjet method and teachings of Allain et al are relied on providing solution as droplets.

Applicants remaining arguments regarding teachings of Allain et al are reiterative (Remarks, pgs. 15 and 16) and are not persuasive for the same reasons as described above.

Conclusion

10. No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Narayan K. Bhat whose telephone number is (571)-272-5540. The examiner can normally be reached on 8.30 am to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Nguyen can be reached on (571)-272-0731. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Narayan K. Bhat/

Examiner, Art Unit 1634

/Stephen Kapushoc/

Primary Examiner, Art Unit 1634